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3430 BIOLOGICAL EVALUATION
R2-82-3

THE MOUNTAIN PINE BEETLE OUTBREAK POTENTIAL OF EAGLES NEST WILDERNESS (East Side), 1982

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ROCKY MOUNTAIN STATION

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THE MOUNTAIN PINE BEETLE OUTBREAK POTENTIAL OF EAGLES NEST WILDERNESS (East Side), 1982

PREPARED BY: C. Kendall Lister
C. K. LISTER
Supervisory Entomologist

APPROVED BY:

G. L. DOWNING
Staff Director
Forest Pest Management

LARRY D. HENSON
Deputy Regional Forester
State and Private Forestry

Forest Pest Management
USDA Forest Service
Rocky Mountain Region
11177 W. 8th Avenue
Lakewood, Colorado 80225

INTRODUCTION

In response to a commitment made during a Summit County Mountain Pine Beetle Vegetative Management meeting held at Pingree Park on September 14, 1981, a biological evaluation to assess the mountain pine beetle (MPB) outbreak potential in the Eagles Nest Wilderness (east side) was conducted by Entomologist C. K. Lister.

Currently a MPB outbreak is underway in Summit County, Colorado, centered around Dillon Reservoir. In close proximity to the MPB infestation and Dillon Reservoir lies the east boundary of Eagles Nest Wilderness (Figure 1). Currently the USDA Forest Service, in cooperation with the Colorado State Forest Service (acting on behalf of the Summit County government and private landowners), have developed an Integrated Forest Management Plan for mountain pine beetle control, which is in the early stages of implementation. The plan is multi-year and expected to be completed in five years (1986). In the preparation of the Environmental Assessment and Decision Notice (1981), it was determined that 13,549 acres are susceptible on the basis of elevation.

Therefore, it was deemed imperative to better understand the risk of MPB infestation in the Eagles Nest Wilderness. This biological evaluation will assess the susceptibility of the east side lodgepole to MPB infestation utilizing the risk-rating scheme designed by Amman, et al (1977).

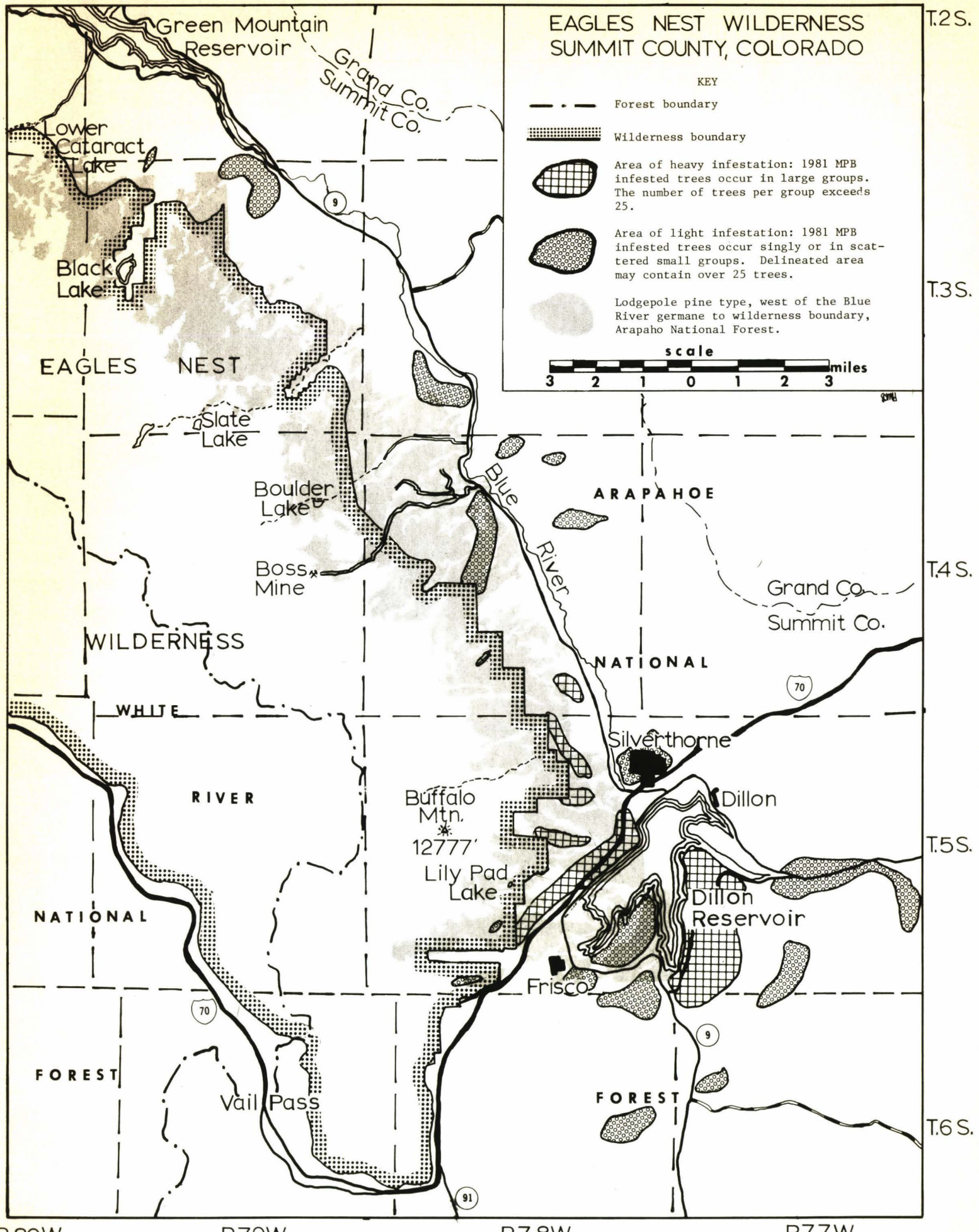
BACKGROUND

The life cycle of mountain pine beetle is generally one generation per year, with the attack period occurring mostly from July 15 to September 1. For additional biological information, see Forest Insect & Disease Leaflet 2, USDA Forest Service, July 1979 (McCambridge, et al 1979).

It is natural for MPB populations to increase periodically and kill most of the large diameter trees in a stand before subsiding. The frequency of epidemics appears to be site related, with stands on better sites becoming higher risk more rapidly than those on poor sites. The frequency of epidemics appear to range from 20 to 40 years.

Mountain pine beetle epidemics develop in stands where the following characteristics coexist: (1) average stand diameter is 8 inches or greater; (2) average stand age is 80 years or more, and (3) climatic suitability as associated with elevation and latitude relationships.

Figure 1: Mountain pine beetle infestation in Summit County, Colorado. July 27, 1981.



PROCEDURES

During the last week of January and the first week of February 1982, an extensive survey was conducted to gather data about the lodgepole component within the Eagles Nest Wilderness (east side) at public access points. At the access points, transect lines were laid out through Lpp 7, 8, and 9 timber types where variable plot (BAF 10) data were recorded at 2 chain intervals. Data recorded at each plot were diameter at breast height (d.b.h.) for all lodgepole pine greater than 5 inches, MPB trees infested in 1981, trees killed by MPB prior to 1981, and dwarf mistletoe infection was rated using Hawksworth's (1977) 6-class rating system. Tree age was determined from increment cores extracted from plot trees selected on a nonsystematic basis.

Historically, severe MPB epidemics occur in lodgepole pine stands with a high proportion of large diameter trees, age is greater than 80 years and location is in a favorable climatic zone. Beetle survival is adversely affected at the upper elevational zones which is recognized with tree losses being lower.

Recognizing these three conditions Amman et al (1977) developed a scheme to predict stand susceptibility. Elevation and latitude, age and average d.b.h. are used to predict stand susceptibility. Risk factors are assigned numerical values (1 = low; 2 = moderate; 3 = high) to the three aforementioned conditions. By multiplying the risk factors the stand susceptibility classification is obtained: low = 1 to 9; moderate = 12 to 18; high = 27. According to the model for elevation-latitude presented by Amman et al (1977) the appropriate elevational zones would be: low = >10,500'; moderate = 9,400' to 10,500'; high = <9,400'.

Therefore, the information collected for this evaluation can be plugged into the following criteria to classify the susceptibility of the lodgepole component to MPB infestation.

Elevation-latitude	*	Average Age (years)	*	Average d.b.h. (inches)	*
High, >10,500'	(1)	<60	(1)	<7	(1)
Mod, 10,500' to 9,400'	(2)	60-80	(2)	7-8	(2)
Low, <9,400'	(3)	>80	(3)	>8	(3)

* Numerical risk values

For example, when the risk factors for a high elevation stand (risk of 1) which is 70 years (risk of 2) with an average d.b.h. of 10 inches (risk of 3) are multiplied (1x2x3 = 6) the stand is low risk to MPB infestation.

The survey data collected were summarized to display the diameter distribution of lodgepole pine greater than 5 inches d.b.h. in terms of trees per acre.

RESULTS

Analysis of the survey data indicate there are 283 trees per acre of lodgepole pine 5 inches d.b.h. and greater (Table 1). The average d.b.h. is 8.84 inches. Lodgepole age ranged from 45 to 150 years with the average being 108 years. The dwarf mistletoe rating average was 4.6 (6-class rating system).

Table 1. Lodgepole Pine Diameter Distribution in Eagles Nest Wilderness (east side)

Survey Base: 42 plots, BAF = 10

This table includes host trees only - lodgepole pine
- numbers of trees per acre -

D.B.H.	Live (Green)	Infested (MPB)	Older Dead (MPB)	Infected (DM)1/	Total
5.0-5.9	41.94			5.79	47.73
6.0-6.9	43.37			7.23	50.60
7.0-7.9	42.84			10.12	52.96
8.0-8.9	35.08	.61		9.08	44.77
9.0-9.9	23.20			4.83	28.03
10.0-10.9	20.14	.79	.40	3.16	24.49
11.0-11.9	12.56	.99		.66	14.21
12.0-12.9	9.22			.28	9.50
13.0-13.9	4.32	.24	.24	.24	5.04
14.0-14.9	3.74				3.74
15.0-15.9	.73			.18	.91
16.0-16.9	.64				.64
17.0-17.9	.29				.29
18.0-18.9	.26				.26
19.0-19.9	.12				.12
20.0-20.9	.10				.10
Total	238.55	2.63	.64	41.57	283.39 2/
Percent	84.18	.93	.22	14.67	100.00

1/ Dwarf mistletoe infected trees are still live, the average Dwarf Mistletoe Rating (DMR) = 4.6.

2/ Average diameter (DBH) for host trees is 8.84.

Utilizing the risk factors of moderate = 2, or high = 3, for the elevation-latitude with the survey findings; average age, 108 years (risk factor = 3) and the average d.b.h. of 8.84 inches (risk factor = 3), the product is a risk classification of 18 or 27, moderate and high, respectively.

Planimetering of the within wilderness lodgepole pine 8 and 9 timber type maps up to the 10,500' elevation yielded 13,549 acres which are classified as moderate and high risk. Only 300 acres were classified low risk due to high elevation (>10,500'). There are 323 acres of lodgepole 7 type which are low risk due to d.b.h. located at the lower elevations.

At present MPB activity is limited to a few groups. MPB infestations in Summit County were sketch-mapped on July 21, 1981. At that time, five small groups were located within the Eagles Nest Wilderness (Figure 1). Since the sketch-mapping was conducted the beetles have flown, so it is reasonable to assume there are more infestation groups and probably larger groups within the Wilderness.

Attack ratios were not determined within the Wilderness; however, it is estimated the attack ratio would be at least 1 to 1. An attack ratio was calculated from one of the most severe infestation spots known (there were 76 MPB infested trees per acre). Its location was along the west side of Dillon Reservoir and Interstate 70; which was strip cruised in October 1981 and the attack ratio was 1 to 1.

DISCUSSION

Recognizing the high risk for a severe MPB outbreak within the wilderness, lets assume it will happen within the next 10-15 years. Is there a need to suppress it within the wilderness? Is there a need to do something outside the wilderness to minimize the impacts from the wilderness outbreak?

According to FSM 2324.1, "Insect and disease outbreaks will not be artifically controlled, unless it is necessary to protect timber or valuable vegetation outside the wilderness".

The Forest Supervisor, through the environmental analysis process (1981), has made the decision to select the alternative which proposes a combination of direct suppression, direct prevention and silvicultural stand treatments on all lands except designated wilderness and wilderness study areas. Following that decision the USFS and Colorado State Forest Service (representing county and private landowners) developed an operating plan scheduling a spectum of treatments over a five year period. The treatment objectives are to reduce the MPB population and silviculturally treat highly susceptible stands to lower their risk to MPB. With full implementation of this plan other benefits expected to accrue include: protection of private property value, increase in water yield, reduction of dwarf mistletoe, and increased diversity in wildlife habitat.

Based upon our present knowledge, full implementation of the plan, and continued silvicultural treatments of stands beyond the five-year planning period, would achieve an adequate level of MPB habitat modification to protect non-wilderness land values from an ongoing MPB outbreak within the wilderness.

Two "uncertainties" which can be considered together is the time frame of implementation of the plan in relation to an outbreak building in the wilderness and less than full implementation of the plan due to fiscal constraints. The adverse effect of either of these uncertain events can be mitigated by ensuring that treatments outside the wilderness are scheduled in relation to their value and effect in protecting the highest values first. This can only be determined through a rigorous analysis of each site specific situation. For instance, emphasis on preventive spray within campgrounds, administrative sites and some private homesites may be more important if adjacent intermingled sites cannot be silvically treated for a year or more. Excessive reliance on direct chemical control while giving the appearance of buying time in an area does nothing for modifying MPB habitat. Salvage sanitation reduces the unacceptable redtops. Adjacent intermingled lands of somewhat lower value may have to be deferred and losses accepted. Under this premise some benefits would be lost and the MPB infestation within the wilderness would continue to express itself. Since the high priority areas would be addressed an adequate level of protection would be present with minimal threat to non-wilderness values from allowing the beetle to progress naturally within the wilderness under a partial implementation of the non-wilderness plan.

CONCLUSION

It is obvious the lodgepole pine forest along the east side Eagles Nest Wilderness is highly susceptible to a severe MPB outbreak. Currently, the infestation level is low, however, beetle activity is high on adjacent Forest Service and private lands outside the Wilderness boundary. The susceptible host condition makes it highly probable that a MPB outbreak will develop within the Wilderness regardless of actions taken outside its boundary. However, the threat to stands outside the wilderness from an outbreak within the wilderness will be diminished in direct relationship to the rate stands outside the wilderness receive silvicultural treatment.

REFERENCES CITED

Amman, G.D., M.D. McGregor, D.B. Cahill, and W.H. Klein. 1977. Guidelines for reducing losses of lodgepole pine to mountain pine beetle in unmanaged stands in the Rocky Mountain. USDA For. Serv. Gen. Tech. Rep. INT-36, 19p.

Cole, W.E. and G.D. Amman. 1980. Mountain pine beetle dynamics in lodgepole pine forests. Part I: Course of an Infestation. USDA For. Serv. Gen. Tech. Rep. INT-89, 56p.

Hawksworth, F.G. 1977. The 6-class dwarf mistletoe rating system, USDA For. Serv. Gen. Tech. Rep. RM-48, 7p.

USDA Forest Service, Environmental Assessment, Dillon and Holy Cross Ranger Districts, White River National Forest. 1981. Integrated forest management for mountain pine beetle control, 17pp.